

NOV, 1986

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ZX-Appeal

Newsletter of the

Vancouver sinclair users group

next meeting:

KILLARNY COMMUNITY CENTRE
6260 KILLARNY ST., VANC

November 14/86

ZXAPPEAL IS A MONTHLY
NEWSLETTER PUT OUT BY THE
VANCOUVER SINCLAIR USERS GROUP.
FOR MORE INFORMATION ON THE
CLUB AND ZXAPPEAL SEE THE BACKCOVER.

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**VANCOUVER
SINCLAIR
USERS
GROUP**

THIS ISSUE.....

This month we conclude Wilf R's. article on his ZVOICE. Wilf has also dropped off an article allowing us to greatly augment Ken A's. ZXDRAW from the summer issue.

....TURBO ZXDRAW!!!

Harvey T. continues with his "Playing With Electricity" series. This time Harvey introduces us to Cyclic Redundancy Code, not that most of us require any introduction to this old friend. Uh huh, sure. Harvey also lets us in on the latest news from Motorola about the new MC68030 32 bit-er. All you QL'ers please pay special attention to Harvey's META MEDIA advert.

John B's. WEYMIL CORPORATION has a new advert detailing some of the very high quality wares he carries. We welcome a new advertiser -- Gulf Micro Electronics. Their product is SMART TEXT TS-2068 - a complete administrative software package. A review of this program package is reprinted from TS Horizons. Make a note of the PCCFA's Swap Meet date. More on this inside. Reprinted from TIME magazine, for anyone who missed it, is the article about the North American intro of AMSTRAD's IBM clone. This machine could prove to be VERRRY INTERRESTING. Rounding out the issue are some select reprints from the best of the NETWORK exchangers.

BITS & PIECES.....

...QL KIT for \$109.00US. This kit is not a do-it-yourself solder job but a plug together easy as pie in half an hour. A number of US groups are going together on a mass purchase from A+ Computer Response. Doug Dewey of the Triangle Users Group is acting as coordinator of the deal. For \$109.00US you receive: case with keyboard, completely built motherboard, 2 microdrives, power supply, RS232

cable, RGB cable, User manual, a short Tech guide, an assembly guide, and two blank drive cartridges. NOTE: no software or software documentation is included. THIS IS A TERRIFIC DEAL. If you want to get in on this, let me know NOW. I'll forward your name to Doug. He'll send you a card when the shipment is going out. Only then do you send any money. Remember, the QL is considered by those in the know to be such a fine machine that even though AMSTRAD has halted production, TWO QL clones are already on the market in Britain.

...AMSTRAD/SINCLAIR has come out with an improved version of the SPECTRUM...the Spectrum + 2. This thing has everything: "real" keyboard, built-in tape recorder --no volume or tone controls, joystick ports, RS 232, MIDI, RGB, TV, sound, optional external keypad. The word is that most software and hardware add-ons should work. Apparently a full review is in the October issue of Sinclair User. If anyone gets this particular mag, lets us know and we'll print a more in-depth report to share with all.

A TIP OF THE FEDORA TO:

RENEWING MEMBERS:

A.Boisvert, W.Rightner, L.Montminy,
B.Dennison, K.Grant, H.Taylor,
G.Brenung, D.Couzens, B.Winton.

NEW MEMBERS:

Bill Jones, Panama City, Florida
Joe.E.Jenkins, Amarillo, Texas
Rusty Townsend, Richmond, B.C.

Welcome aboard boys, hope you enjoy the ride.

NOTICE: From time to time we print hardware articles of a do-it-yourself nature. It should go without saying that we, meaning him the writer and me the editor, have no control over what you are doing if you attempt the suggested project. Therefor, if you smoke your machine, you have our sympathy but thats it. Any hardware article printed in this newsletter is either based on a project successfully completed by the author, or, if a reprinted article, been successfully completed and tested by the editor.

NOTICE: the signal booster described in the October issue should be only used on a 2068. It has been mentioned that a 1000 might be liable to damage if the booster is used to boost the signal going into a 1000. Something about the voltage being too high for the ULA chip.

Over the last little while, we have seen a renewed interest with speech synthesis on the ZX81. If anyone wants to experiment in this area, remember the club still has a supply of the I/O boards, ZSpeak boards, ZSound boards, and also some 16k boards. Contact the treasurer if you want to purchase any of these.

ERRATUM

In Ken Abramson's article, "Simple Text-to-Speech in Software" in the last newsletter, one phonetic variable was in error. Line 20 should read: LET OR = 58

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Pacific Coast Computer Fair Association's

SWAP MEET & FLEA MARKET

This year the PCCFA is holding their fair as a swap meet at Burnaby Central Senior Secondary on November 16, the Sunday right after our next meeting. The club has arranged with the organisers for 3 exhibition tables. Three FREE entry tickets are given with each table so those members manning the tables will not be required to pay an admission fee. Lets have everyone consider manning the club tables and demoing their systems. Lets surprise the MAINSTREAM GROUPS with the versatility of the Sinclair (Timex) family of computers. More discussion about the FAIR will take place at our upcoming meeting so make sure you attend.

MURPHY'S LAWS of COMPUTING (cont.)

You always find the information you need on the page you look at last.

The first place to look for information is in the section of the manual where you least expect to find it.

You know you have a real crisis on your hands when you can't say "Let's forget the whole thing".

The time it takes to fix the error in your spreadsheet is inversely proportional to the time it took to do the damage in the first place.

When the going gets tough --- upgrade.

For every action there is an equal and opposite malfunction.

In technology, anything is possible if you don't know it isn't available yet.

To err is human....to blame your computer for you mistrakes is even more human.

He who laughs last probably made a backup.

If at first you don't succeed -- blame your computer.

That which cannot be serviced will require the most service.



2nd Annual

Pacific Coast Computer Fair Association's

SWAP MEET FLEA MARKET

Sunday, November 16th

10 am. to 3 pm.

- Featuring:
- Speakers
 - Public Domain Software
 - User Group Displays
 - Workshops
 - New/Used Hardware & Software
by Private Individuals and
Computer Stores
 - Bargains Galore
 - Refreshments

General Admission: \$2.00
Table Rentals: \$15.00 (*Before Oct. 31*)
\$20.00 (*After Oct. 31*)

Pre-registration: Phone Dave at 270-0064

Burnaby Central Senior Secondary
4939 Canada Way, Burnaby

West of Sperling Exit

WEYMIL presents...

A small collection of truly innovative products for Sinclair computers

THRUST TS1000

True hi-res graphics for the TS 1000. THRUST is two great programs on one tape. Sinc-Artist 1.3 is the most user friendly software ever developed for printer graphics. Completely cursor and menu driven. For Hunter Board users, there's Sinc-Artist HR which produces fantastic screen graphics. THRUST is both the most sophisticated and easiest to use hi-res graphics software ever developed for the TS 1000. If you are ready for no-nonsense, hassle free graphics, then THRUST is a "must have."

THRUST for the TS 1000 only \$20.00

ARTWORX V1.1 TS 2068

England's finest graphics package! ARTWORX V1.1 establishes a new standard for color graphics with features never before available on small systems. Auto speed control, pull down menus, unique cut and past windows, ZOOM!, elastic shapes, multiple fonts, CENTRONICS I/F capability for full-size print-outs, and more. All this plus an absolutely uncluttered screen for full creativity. Easy to use. The joystick controls EVERYTHING except text entry. The highly supportive well-written documentation is almost unnecessary.

ARTWORX V1.1 for the TS2068 only \$19.95

PIXEL SKETCH AND GRAPHICS

EDITOR V2.0 TS 2068

This program by Stan Lemke still remains the finest graphics program produced in the United States and one of the best in the world for the TS 2068. It has had excellent user group reviews and is a snap to use. Well written, step-by-step documentation guides you effortlessly from loading to producing your own "masterpiece." Great pixel and text placement control.

PIXEL SKETCH AND GRAPHICS EDITOR V2.0 only \$19.95

KRUNCHER TS 2068 / TS 1000

From the Pacific Northwest comes one of the most exciting utilities ever written. KRUNCHER takes any BASIC program for the TS 2068 or TS 1000 and instantly reduces it to the tightest BASIC possible thereby conserving precious memory. Imagine all of those little memory saving tips developed over the years in one program which performs automatically and takes up less than 190 bytes! Simply load KRUNCHER, locate it where you want it, load or write your BASIC program, invoke KRUNCHER, blink your eye and it's done. Memory savings average 20-40%. Great learning aid for programmers of all levels.

KRUNCHER for TS1000 or TS2068 only \$10.00
(Please specify TS1000 or TS2068)

TIME MACHINE TS 2068

The first SERIOUS COMPILER for the TS2068. Now you can convert BASIC programs to super fast MACHINE CODE without a lot of hassle. Converts both TS 2068 and SPECTRUM Programs. It functions as both an integer and floating point compiler simultaneously without the restrictions of either. Compiled code can be placed anywhere in RAM. Handles up to 27K of BASIC. Programs can be either written or loaded from tape. You've waited a long time for this one and here it is!

TIME MACHINE for the TS2068 only \$19.95

RIGTER JOYSTICK INTERFACE TS 1000

This is a software programmable Atari-type joystick interface. It can handle up to 16 different directions or commands easily. It has it's own self-contained memory so that it's software occupies no system ram. The software allows you to configure your joystick to ANY TS1000 game or graphic software (THRUST, for example) and it's ready to go. Rear expansion bus allows other peripherals and the interface is completely transparent.

RIGTER JOYSTICK INTERFACE for TS 1000 only \$39.95

MINI XMOD TS 1000

Use your TS1000 and Westridge modem to up/download TS1000 software to any XMODEM BBS and see them run. Supports Memotech Centronics I/F and others for print-outs to full size printers. Standard RAM and Hunter Board versions included on same tape.

MINI XMOD for the TS 1000 only \$20.00

LOADER V TS 2068

This program turns MTERM into a REAL communications program. Here's what you get. Auto-repeat dialing, extra 20 number dialing directory, full TASWORD II and MSCRIPT text file handling capability, disk drive and Wafer drive compatible, multiple loading of Mterm's buffer while on line, and full XMODEM capability. This program is the COMPLETE LOADER SERIES.

LOADER V for TS 2068 only \$10.00

CLONE TS 2068

A sophisticated program which allows the user to make back-up copies of ANY TS2068 or SPECTRUM software for their own use. Requires no fancy filters or extra tape recorders. Easy to follow instructions make it simple to protect your valuable originals.

CLONE for the TS2068 only \$10.00

SPECIAL OFFER!!!

Save \$5.00 when you order the combination of THRUST, RIGTER JOYSTICK INTERFACE, and KRUNCHER 1000 you pay only \$64.95

SHIPPING INSTRUCTIONS Please enclose \$2.00 shipping and handling with your order.

WEYMIL CORPORATION

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BELLINGHAM, WA 98227-5904

Reviews by Tex

Software Review
by Tex Faucette

SMART TEXT TS-2068
Copyright 1984 by Gulf Micro Electronics,
1317 Stratford Ave., Panama City, FL 32404
(904) 871-4513.

Please note that this is a limited review. I began with this program some time ago, but before my review was completed my 2068 "expired." I hasten to note that the program had nothing to do with said demise.

Many programs may be evaluated and either reviewed or rejected in a single session at the keyboard. This IS NOT TRUE in the case of Bill Jones' SMART TEXT TS-2068. In fact, upon first reading the 70-page manual, my reaction was, "Egad, he has reinvented Wordstar!" Of course I jest. Nevertheless, a mere listing of the features and functions approaches the unbelievable.

Quoting from the attractive cover of the latest (and in my judgement, improved) 70-page manual, SMART TEXT TS-2068 is, "Integrated Administrative Software Featuring Data Base Management, Mailing List, Word Processing, Label Printing, Auto Letterheads, Form Letters, Repeat Print Multi-page Manuals [such as the one from which I am quoting], Direct Type-Print, Supports all Interfaces, Universal Printer Patch." Versions are available for Cassette and all interfaces, Zebra OS-64 Cartridge, Aerco Disk, and A&J Microdrive.

All the above features would appear to stretch the capacity of the un-expanded 2068. Bill Jones admits that his first version ate up all available memory before he had all the features he desired, and he was forced to "invent" what he terms "DENSE PACK BASIC."

"DENSE PACK" being Bill Jones' invention, I leave the full tutorial chore to him. And, of course, I hope he will write it up for a future issue of TSH. In brief, the system utilizes all of the memory saving tricks I ever heard of plus more that may forever remain "beyond my ken." Such things as "PSEUDO-HEX variables" almost make sense to me, but such things as 10 conditional IF THEN statements with a few VALs thrown in residing in a single program line leaves me gasping for breath. Even so, IT IS BASIC and can be readily modified by following instructions contained in the manual. In this regard, it behooves one to LLIST the program for reference during the modifications. It only requires somewhere around 12 feet of paper on the 2040 printer, and the results may be wrapped around a couple of pieces of broomstick or mop handle for manual scrolling. Of course the knowledgeable user will perform any such modification on a "working copy" of the program. According to the manual the original program length was 32K. DENSE PACK yielded the current program length of only 20K.

Use of the Universal Printer Patch requires entry of certain data obtained from one's printer manual (it should be noted that some older printers are sadly deficient in the manual department) and also may require editing of a few program lines. This operation is very thoroughly explained in the SMART TEXT MANUAL. Those who have ranted, raved, and resorted to strong language trying to make a printer behave will appreciate this feature.

SMART TEXT TS-2068 is menu-driven. In fact, there is an abundance of menus. Fortunately, the latest version of the manual has four pages of diagrams of menu relationships; a veritable "road map" to assist one in arriving at Proficiencyville. Data is stored in "array cells" or "data banks" by menu selection from whence it may be recalled in any desired order for further printing, or whatever. This results in a high degree of flexibility, but the rather complex system will require some study and usage before maximum productivity is attained.

I end up with mixed feelings concerning SMART TEXT TS-2068. It is much too complex a program for most of my writing chores. Yet, on the other hand, when I write The Great American Novel... I will probably also have to publish it.

Due to the time lapse, I hesitate to quote prices for the various versions of SMART TEXT TS-2068, so why not write or call Bill Jones at the above address or number. Tell him who sent you. TSH

*** SMART TEXT TS-2068 ***

Administrative Software

Data Base - Word Processing
Mailing List - Repeat Printing
Form Letters - Auto Letter Head
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All integrated functions.

Versions For:

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CASSETTE - ZEBRA OS-64 Cart
Each Package includes four programs. The Cassette and Oliger Disk versions includes one for the OS-64 Cart.

The most comprehensive software for the TS-2068.

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Panama City, FL 32404
Inquiries welcome

Megabytes for the Masses

Amstrad prospers by selling computer hardware at soft prices

The headquarters of Amstrad Consumer Electronics in Brentwood, a gritty London suburb, looks as unpretentious as the company's products. The nine-story brick building is located atop a pub called the Railway Tavern. Inside, smudged fingerprints compete for attention with sales and production charts on the bare white walls, and foam rubber has started poking through the seams of several of the upholstered chairs in the conference room. Says a company spokesman: "The place has very much a working-class air about it."

Amstrad can afford to look déclassé. At a time when the British personal-computer industry is sagging, Amstrad, which derives 80% of its revenues from the sale of computers and related products, has been leaping from one success to another. The company last month became the first European firm to introduce an inexpensive personal computer that is fully compatible with the popular IBM PC. Says John Clarke, electronics analyst for Capel-Cure Myers, the London stockbrokerage firm: "Amstrad and its chairman, Alan Sugar, are the rising stars of the United Kingdom's consumer electronics industry."

Two weeks ago the company announced that sales for the fiscal year ending last June 30 rose 123% over the year before, from \$197.2 million to \$440.8 million. Pretax profits were up 273%, from \$29 million to \$109.2 million. As a result, Amstrad was able for the sixth successive year to increase the dividend paid to stockholders, this time by 84%.

Amstrad's computers are not the most advanced models available. But Sugar knows how to spot a market, exploit it and keep costs down. "The root of Sugar's genius is that he sees things in very simple terms," says Keith Woolcock, an electronics analyst with Chase Manhattan Securities. "He waits until the market matures and then moves into its mass phase." Unlike some other firms, Amstrad has not forgotten that its primary goal, in the words of Malcolm Miller, head of sales and marketing, is "giving the consumer what he or she wants at the price he or she can afford."

Sugar, 39, who grew up in the working-class neighborhood of East London and left school at 16, got his start in business by selling car-radio antennas from the back of a rented van. He founded Amstrad in 1968 as a wholesale distributor of cassette players, speakers and other electronic gear for cars. By 1970 the company had enough capital to manufacture its first product, plastic dust covers for stereo

turntables. Over the next few years the firm did well, but it was not until the late 1970s that Sugar came up with a hit: a low-priced, stackable stereo system. By the time Amstrad went public in 1980, the company was reporting annual revenues of \$13 million.

Even so, there were plenty of skeptics when, in 1984, Sugar launched his first computer, the CPC 464. The market was dominated by such established



Alan Sugar with his IBM-compatible PC 1512

"His genius is that he sees things in very simple terms."

firms as Sinclair, Acorn and Commodore. But Amstrad's computer had advantages: it was more reliable than some comparable models, and it was sold as an integrated package complete with keyboard, built-in tape drive, and a monitor so that it did not have to be plugged into a television set.

The CPC 464 was an immediate success. A year later, in July 1985, Amstrad introduced the PCW 8256, a dedicated word-processing computer aimed at both home users and small businesses. Following his strategy of offering a complete package, Sugar sold the 256-kilobyte PCW as a package—keyboard, monitor, disk drive and printer. Price: \$579, about the cost of a good electric typewriter. At the time of the launch, industry experts esti-

mated the British market for dedicated word processors at about 50,000 units a year. Over the next eight months Amstrad sold 300,000, and is now producing 50,000 a month. Once again Amstrad was able to offer a reliable product that was easy to use and sold for a fraction of the cost of competing units.

How is Amstrad able to do it? The company handles little of its production and distribution and thus avoids overhead costs. Manufacturing work is contracted out, mainly to Far East production centers in countries like South Korea. Says Jim Price, Amstrad's group operations manager: "The philosophy that runs

throughout the company is, Why not get somebody else to do it?" Amstrad's only disappointment so far concerning the PCW has been the slow sale of the computer in the U.S., where Sears World Trade, the distribution arm of Sears, Roebuck & Co., the giant Chicago-based retailer, has contracted to market the PCW through Sears' outlets and other major chains. In an effort to boost sales, Sears recently dropped the retail price of the PCW from \$699 to \$499.

Amstrad's new IBM clone, the PC 1512, promises to be one of Sugar's biggest triumphs. The initial reviews have been ecstatic. "The Amstrad PC is the most substantial, most exciting launch since the ark," says Chase's Woolcock. The basic model, with a monochromatic screen and 512 kilobytes of memory, sells for \$579, including monitor, keyboard and a single disk drive. The top-of-the-line model has a full-color screen, two disk drives and a 20-megabyte hard disk, all for \$1,375. At those prices, Sugar hopes to develop a new market among smaller businesses.

Amstrad is not pinning its future only on computers. The company has joined a consortium—at a reported cost of at least \$14.5 million—composed of two British independent television companies, Granada TV and Anglia TV, along with two other firms, Virgin and Pearson Longman Ltd. The consortium is one of six applicants bidding for the franchise to bring satellite television to Britain. Should the group win the license, which is to be awarded later this year, Amstrad would develop both the satellite dish and the "black box" decoder that subscribers will need to receive and unscramble the satellite signal.

The proposal is Amstrad's most ambitious yet. "We could be in on the ground floor of something that could be absolutely enormous," says Price. "It's a high-risk venture, but if you don't take risks, you don't make money." True to form, Amstrad projects that its hardware for satellite reception would retail for an affordable \$288. —By Marguerite Johnson. Reported by Steven Holmes/London

PROBLEM:

Can the "major disadvantage" in the program ZXDRAW by KEN ABRAMSON (ZXAppealjul/aug 86) be eliminated?

ANSWER:

Can the TS1000 run machine code?

Well, as you can tell, I am poking a bit of fun at BASIC for the snaillike speed with which it performs some simple tasks. But if you are a BASIC programmer, do not despair, there are some things at which BASIC excels.

The "major disadvantage" that KEN was referring to are the lines 400 to 450 and 540 to 590 of his program which "poke" and "peek" bytes from the DISPLAY FILE (DFILE) to the VAR D\$. The first routine which saves DFILE to the string variable can be easily replaced by the ML routine in LISTING 1.

The annotation gives the details but in general the routine saves DFILE to 1 of 8 strings in string array A\$(1-8). The N/L characters are not saved, so that the screen can later be "LOADED" using: PRINT AT 0,0; A\$(n).

First create LINE 1 REM (44 SPACES).

Then the decimal bytes in LISTING 2 can be poked into PROGRAM LINE 1 with a simple FOR/NEXT loop.

If you want to make LINE 1 invisible POKE 16514/5,118.

Typically BASIC calls the ML routine with: LINE 2 CLEAR: LINE 3 DIM A\$(8,704): LINE 400 RAND n: LINE 410 RAND USR 16516 where n=1 to 8.

Run in the "SLOW" mode, the transfer is almost instantaneous and (this is where the BASIC comes through) so is the PRINT A\$(n) which accomplishes the same in reverse order.

Note that the a\$(8,704) array must be the FIRST defined variable although any other string array name may be chosen.

We can use this routine with any program requiring the "SAVING" of screens to a variable but one of the more interesting applications will be to create some animation using KEN'S ZXDRAW.

WILF R. logging off.

;LISTING 1

```
LD HL, (+16400); TOP OF VAR
LD A, (+16434); LSB OF SEED
DEC A; SEED MUST BE >=1
AND 7; MAX 8 SCREENS
JR Z LPA; IF SCREEN=0, SKIP
LD B, A; MULTIPLY NUMBER OF
LD DE, +704; SCREEN BY +704
ADD HL, DE; +704=22*32 CHAR
DJNZ LP; TO FIND A$(B+1)
LD DE, 8; OFFSET FOR HEADER
ADD HL, DE; A$(N) ADDRESS
EX DE, HL; TRANSFER TO DE
LD HL, (+16396); DFILE ADDR
LD B, +23; 22 LINES/23 N/L
LD A, (HL); GET DFILE CHAR
CP +118; IS IT N/L?
JR NZ LP1; IF NOT, GO SAVE
INC HL; ELSE SKIP N/L
DJNZ LP0; REPEAT 23X
RET; BACK TO BASIC
LD (DE), A; SAVE CHAR IN A$
INC HL; NEXT SCREEN ADDR
INC DE; NEXT A$ ADDR.
JR LP0; REPEAT
```

;LISTING 2

```
16516-42,16,64,58,50,64,61,230,
16524-7,40,7,71,17,192,2,25,
16532-16,253,17,8,0,25,235,42,
16540-12,64,6,23,126,254,118,32,
16548-4,35,16,248,201,18,35,19,
16556-24,242,
```



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Hopefully this month I will be able to kill 2 birds with one routine. Well, one concept, two implementations...in particular, of Cyclic Redundancy Code.

You might never have heard the term, but if you have used Xmodem, or a disk drive the chances are good that CRC has been there in the background watching for errors. I am not going to even try to explain the mathematics of it. If you are bound & bent to get into the why of it all, check the reading list below.

The other bird at hand, to begin mixing metaphors, is the question I commonly get asked; which is 'What is so great about this 68xxx processor?'

I should set up the context. CRC is used in situations where you are moving data from one place to another serially. For example, in xmodem, data is arbitrarily divided into 128 byte blocks & the CRC of that block is computed, at the sending end & at the receiving end. In a disk drive, the CRC is done in hardware by the Disk controller chip & the user doesn't usually get to see anything but the results.

There are different sorts of CRC used; the generator in these examples is $x^{16} + x^{12} + x^5 + 1$.

In Z80 assembler this code will look something like this:

* Expects Byte in A , Updates CRCSTORE

```

UPDCRC  PUSH  BC          * SAVE WORKING REGS
        PUSH  HL
        LD    B,8         * COUNTER
        LD    C,A         * SETUP C
        LD    HL,(CRCSTORE)
UPDLOOP LD    A,C         * GET CURRENT VAL
        RLCA              * BIT 7 TO CARRY
        LD    C,A
        LD    A,L
        RLA              * CARRY TO BIT 0
        LD    L,A        * & BIT 7 TO CARRY
        LD    A,H
        RLA              * EFFECTIVELY
        LD    H,A        * ROTATE HL
        JR    NC,SKIPIT

*
        LD    A,H        * BINARY MULT
        XOR   $10        * BY $1021
        LD    H,A
        LD    A,L
        XOR   $21
        LD    L,A

*
SKIPIT  DJNZ  UPDLOOP     * DO ALL 8 BITS
        LD    (CRCSTORE),HL
        POP   HL
        POP   BC        * RETRIEVE REGS
        RET

```


Now whether the intent of this code is transparent to you or not, you will have to admit that the shenanigans one has to go through to manipulate 16 bits cause a pain in the lower portion of the anatomy. Contrast the above code with the 68000 code below.

Expects data in D1, Update CRCSTORE

UPDCRC	MOVEM.L	D1/D4/A3, -(A7)	* SAVE REGS
	LEA	CRCSTORE, A3	
	MOVE.W	(A3), D3	* GET CRC
	MOVEQ	#7, D0	* COUNTER
CRCLOOP	ASL.B	#1, D1	* BIT 7 TO X/C
	ROXL.W	#1, D3	* X/C TO BIT 0, BIT 15 TO X/C
	BCC	NEXTBIT	
	EORI.W	#\$1021, D3	
	DBRA	D0, CRCLOOP	
	MOVE.W	D3, (A3)	* UPDATE CRCSTORE
	MOVEM.L	(A7)+, D1/D4/A3	
	RTS		

Which would you rather deal with? As for why would anybody want to be doing this, well take a gander at these articles.

Dr.Dobb's, June 1985, Page 66
 Dr.Dobb's, February 1986, Page 26
 Byte, September 1986, Page 114
 Computer Language, June 85, Page 71
 Any Math text on Error detection &/correction

It is not my intent to knock the Z80, but rather to demonstrate the power one gains when dealing with a command set which allows almost every instruction to operate on 8,16 or 32 bit data. This ability is not the sole possession of the 68xxx family. The NS32xxx family is similarly structured.

By the way before I go, there is another bird in the bush... NEWS FLASH: Motorola releases the latest generation 32 bit processor, the MC68030. I will append a Motorola document here below.

I got a flyer from Motorola today which has some concrete info on the MC68030 announced mid September. According to this doc the new chip has all the features & functionality of the MC68020 as well as... On-chip demand paged memory management. A subset of the MC68051 PMMU used to translate each logical address to a corresponding physical address. It supports page sizes from 256 bytes to 32K. Increased parallelism. Two independent 32 bit address buses and two 32 bit data buses allow the CPU, caches, PMMU & bus controller to operate in parallel, so the MC68030 can, for example, simultaneously process an instruction from the instruction cache, data from the data cache, and instruction/data from external memory. Transparent memory windowing. The MC68030 allows you direct access 'windows' to the entire address space. Many systems require direct memory access without address translation. Address space windows are required when the MPU directly accesses video memory or a specific sector on a disk. On-chip instruction and data cache. Separate 256-byte on-chip data and instruction caches increase MC68030 performance by reducing the number of cycles required for data and instruction access.

Burst-fillable mode for on chip caches. Overall bus requirements are reduced and multiple processors can run more efficiently thanks to increased bandwidth of the MC68030 bus, achieved by the enhanced bus controller allowing high-speed fills of both data and instruction caches.

Dynamic synchronous and asynchronous bus interface. The MC68030 dynamically supports both synchronous and asynchronous devices. It uses the same easy-to-use non-multiplexed asynchronous bus interface integral to the MC68000 family, and a synchronous bus protocol supports the burst fill mode for both instruction and data caches, permitting a two clock physical bus cycle."

That's the end of the Motorola document. From Electronics (Sept18), one learns the device is done in 1.2 micron CMOS & has 128 pins. Clock speed is to start at 20MHz, by the way, with no upper limit specified. Hal Hardenburgh of DTACI GROUNDED fame thinks 33MHz is the upper limit for 128ns. DRAM with this sort of bus controller. Device availability is scheduled for mid 1987. Samples in late spring, as well as full technical specifications.

One good thing about this chip's existence from my poverty stricken point of view is that it will save the 68020 systems around drop in price.

We continue from last issue with Wilf R.'s article on his one board speech synthesizer -- ZVOICE.

.....
Listing 4 shows how a TEXT TO SPEECH program can be implemented.

A text string is scanned one word at a time, with "spaces" as separators. If the word is in the vocabulary, then the word is spoken; if not found, phonetic pronunciation of the word, or the phrase "WORD UNKNOWN" is spoken.

New words are easily added by defining them as NUMERIC VARIABLES which are then used as an INDEX into the VOCABULARY.

SIMPLIFIED EXAMPLE:

```
B$=PHONEME DATA FOR "ZVOICE"  
B=LEN B$  
B$(B)=CHR$(CODE B$(B)+128)  
A$(END TO END+B)=B$  
ZVOICE=END  
END=END+B  
RETURN
```

A\$ is a I DIMENSION ARRAY which contains the VOCABULARY in phoneme format.

B\$ is a new string of phonemes to be added to the VOCABULARY with the last phoneme identified by adding 128 (set BIT 7).

In this example the text word "ZXVOICE" becomes the name of a numeric variable which is set to END, the pointer to the end of the VOCABULARY.

END is updated by adding the length of the new word in B\$ to END.

The advantage of this method is natural sounding speech from text, the disadvantage is memory overhead for the vocabulary.

The concept of a new PHONEME EDITOR is described here which uses cursors or a joystick to take the tedium out of composing PHONETIC WORDS.

This method would arrange the phonemes and common sound element combinations in a matrix or logical array on the screen.

The cursor movement would select an element which is provisionally added to the end of a phoneme string and is tested by voicing the whole string including the new element.

If it sounds good, it is added to the string, by pushing N/L (ENTER), and then the next element is selected and tested.

Words are built up and when complete are added to the VOCABULARY.

Again the text word can be used as the numeric variable index so that the new phoneme string starts at A\$(TEXT).

In this way any word can be accessed and spoken with the simple BASIC routine:

```
RAND TEXT  
RAND USR 16514
```

These routines are just scratching the surface of a comprehensive speech synthesis package.

SO STAY TUNED FOR MORE.

Next time we connect ZVOICE to the TELEPHONE, add some AI and start a FRENCH/ENGLISH dictionary.

Where can I get ZVOICE?

I am donating copies of the software to the CLUB LIBRARY for noncommercial use by club members.

ZVOICE will be offered to club members as a kit of parts, including a PCB, for approximately \$25.00. Available in 4 to 6 weeks.

WILF R. logging off.

;LISTING 3

```
BUFF JR BUFF1;LOAD SP0256 DATA  
INIT JR INIT1;INIT 8255 IF ANY  
LADR JR LADR1;FIND LINE ADDR.  
BUFF1 LD HL, (+16400);TOP OF VAR  
LD DE,05;SKIP VAR HEADER  
ADD HL,DE;NOTE BUFF2 INC  
LD DE, (+16434);ADD OFFSET  
ADD HL,DE;IN SEED POINTER  
BUFF2 INC HL;NEXT DATA  
SBY1 IN A,27;TEST BIT 7 BUSY  
BIT 7,A;BEFORE DATA LOAD  
JR Z SBY1;REPEAT IF BUSY  
DATA LD A,(HL);GET BUFF DATA  
OUT 17,A;LOAD SP0256 DATA  
STRB XOR A; A=0  
OUT 27,A;STROBE LOW  
CPL; A=FF  
OUT 27,A;STROBE HIGH  
LAST LD A,(HL);GET BUFF DATA  
BIT 7,A;WAS IT LAST DATA?  
JR Z BUFF2;IF BIT7=0 LOOP  
RET; BYE...  
INIT1 LD A,93;PORT A,C(4-7)=IN  
OUT 37,A;PORTB,C(0-3)=OUT  
LD A,0F;DEFAULT DATA=00  
OUT 27,A;STROBE HIGH  
RET;BYE...  
LADR1 LD HL, (+16434);LINENUMBER  
CALL 9D8;IN SEED CONVERTS  
LD DE,5;TO ADDR. OF LINE  
ADD HL,DE;SKIP HEADER AND  
LD B,M;KEY WORD AND PASS  
LD C,L;ADDR. IN REG BC  
RET;BACK TO BASIC
```

16514	118
16515	118
16516	24
16517	4
16518	24
16519	36
16520	24
16521	43
16522	42
16523	16
16524	64
16525	17
16526	5
16527	0
16528	25
16529	237
16530	91
16531	50
16532	64
16533	25
16534	35
16535	219
16536	39
16537	203
16538	127
16539	40
16540	250
16541	126
16542	211
16543	23
16544	175
16545	211
16546	39
16547	47
16548	211
16549	39
16550	126
16551	203
16552	127
16553	40
16554	235
16555	201
16556	62
16557	152
16558	211
16559	55
16560	62
16561	15
16562	211
16563	39
16564	201
16565	42
16566	50
16567	64
16568	205
16569	216
16570	9
16571	17
16572	5
16573	0
16574	25
16575	63
16576	77
16577	201

LISTING 4

```

10 REM
3 DIM A$(255)
4 GOSUB 1000
5 LET HELLO=END
6 DIM V$(15)
7 LET END=END+LEN B$
10 REM PHONEMES ARE ASSEMBLED
   IN B$ AND WHEN COMPLETE WORDS
   ARE ADDED TO VOCABULARY A$
15 CLS
20 PRINT "PHONEME VOCABULARY L
   ENTH =";END
30 PRINT
40 PRINT "INPUT PHONEMES 0 TO
   63"
50 PRINT """"0"" COMPLETES PHRA
   SE"
60 PRINT """"VOC""= EXIT TO VOC
   ABULARY"
110 LET B$=""
120 INPUT A
125 IF A=VOC THEN GOTO 310
130 LET B$=B$+CHR$ A
140 PRINT A;" ";
150 IF A<>0 THEN GOTO 120
199 REM TEXTINPUT/B$ TO BUFFER
200 PRINT AT 19,0;"ENTER TEXT W
   ORD(S) "
210 INPUT T$
215 PRINT T$
217 LET A$(END TO END+LEN B$)=B
   $
220 RAND END
230 RAND USR 16516
235 PRINT AT 19,0;"PRESS ""R""
   TO REPEAT, ""C"" TO CANCEL, N/L T
   O CONTINUE"
240 INPUT C$
250 IF C$="R" THEN GOTO 220
260 IF C$="C" THEN GOTO 10
270 LET V$(17-LEN T$ TO )=T$
280 FOR N=1 TO 16
290 POKE 16586+N,CODE V$(N)
295 NEXT N
300 GOTO 5
310 CLS
320 PRINT "ENTER WORD TO BE VOI
   CED", "NONEXISTING OR MISSPELLED
   WORDS RESULT IN ERROR 2/360", "GO
   TO VOC OR PHON TO RECOVER"
330 INPUT C$
340 IF C$="PHON" THEN GOTO PHON
350 PRINT AT 0,0;C$
360 RAND VAL C$
370 RAND USR 16516
380 GOTO 310
1000 LET END=1
1010 LET G=128
1020 LET VOC=9998
1030 LET PHON=9999
1060 LET B$=""
2000 RETURN
9998 GOTO 310
9999 GOTO 5

```

PROGRAMMING: DID YOU KNOW?

Dick Wagner

Most BASICs will compare strings as to {,=,}, and combinations of these operators. I was surprised to learn that Sinclair BASIC will indeed do this, that is, test one string against another string by using relational symbols. Try this simple test with your 1000 or 2068 computer:

```
10 LET A$='ABC'
20 IF A$ > 'GO' THEN PRINT 'ABC IS
GREATER THAN GO'
30 IF 'GO+0' > A$ THEN PRINT 'GO0 IS
GREATER THAN ABC'
40 IF 'SALLY' < 'GLENDA' THEN GO TO
1000
50 IF 'GLENDA' > 'SALLY' THEN GO TO
1010
1000 PRINT 'SALLY = 389 WHILE
GLENDA = 427'
1005 REM FOR T/S 1000 SALLY = 244
AND GLENDA = 265
1007 STOP
1010 PRINT 'GLENDA IS GREATER THAN
SALLY'
```

You will observe that this method compares on the basis of character weight in terms of ASCII value (or TS 1000 character value). This also works for comparing string arrays.

PEEKs AND POKEs FOR THE TS1000 by Jim Dodrill

RAND USR 836

To LOAD a program and automatically break into it. Go into FAST, then RAND USR 836, and start your tape.

USR 3086

This scrolls the screen and prints at the same time. 10 PRINT TAB USR 3086 "message"

RAND USR 0

Resets the computer.

POKE 16419,X

This will LIST lines 0 to 255, X being the line you list from to line 255.

POKE 16510,0

This will change the first line to 0. If you have machine code in a REM statement in line 1, this will prevent it from being accidentally erased.

POKE 16418,0

Will allow you to PRINT AT the last two lines.

POKE 16418,2

Use after a PRINT statement to get back into normal mode. Will only work in a program line.

RAND USR 3675

Puts computer into FAST mode

RAND USR 3883

Puts computer into SLOW mode.

RAND USR 3086

Scrolls up one line

RAND USR 2153

COPY's screen to printer.

RAND USR 2602

Clears screen.

dB



AUGUST 1986

SU	MO	TU	WE	TH	FR	SA
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

```

1 POKE 23609,20
2 REM PERPETUAL CALENDAR 2068
4 REM ©1984 BY I. AUERSBACHER
8 BORDER 5: BRIGHT 1: CLS : D
IM M$(12,9)
9 BEEP .1,30: GO SUB 1000: CL
S
10 PRINT "PAPER 6:"; *** CALEN
DAR(1583-9999 AD); ***
12 RESTORE : FOR Z=1 TO 12: RE
AD M$(Z): NEXT Z
15 LET Z$=" 1 2 3 4 5 6 7 8 9 1
0 1 1 2 1 3 1 4 1 5 1 6 1 7 1 8 1 9 2 0 2 1 2 2 2 3 2 4 2 5 2
6 2 7 2 8 2 9 3 0 3 1": BEEP .05,20
16 INPUT "Y-YEAR, M-MONTH, D-DAY: "; LINE T$
19 IF T$="Y" THEN GO TO 30
20 INPUT "MONTH (1-12): "; A: IF
A<1 OR A>12 THEN BEEP .5,-20: G
O TO 20
30 INPUT "YEAR (YYYY): "; B: IF
B<1582 OR B>9999 THEN BEEP .5,-2
0: GO TO 30
35 CLS
40 IF T$="Y" THEN FOR X=1 TO 1
2: LET A=X
60 LET B=INT B: LET E=B-(A<3)
65 LET C=A+12*(A<3)+1
70 LET D=INT (E/400)-INT (E/10
0)+INT (1.25+E)+INT (2.6+C)
75 LET D=D-(7*INT (D/7))+1
80 IF (A=4)+(A=6)+(A=9)+(A=11)
THEN LET C=30
85 IF (A=1)+(A=3)+(A=5)+(A=7)+(
A=8)+(A=10)+(A=12) THEN LET C=3
1
90 IF A<2 THEN GO TO 200
100 LET C=28: IF (B/4=INT (B/4)
)+(B/100<INT (B/100))+(B/400=IN
T (B/400)) THEN LET C=29
200 IF T$="Y" THEN CLS
202 PRINT "*****"
*****
205 PLOT 10,132: DRAW 225,0: DR
AW 0,-112: DRAW -225,0: DRAW 0,1
12
210 PLOT 10,118: DRAW 225,0
220 PRINT AT 6,2:"SU MO TU W
E TH FR SA": PRINT AT 3,0:
230 FOR Z=1 TO 6: PLOT 10,116-(
Z-1)*16: DRAW 225,0: NEXT Z

```

```

240 FOR Z=1 TO 6: PLOT 40+(Z-1)
*32,132: DRAW 0,-112: NEXT Z
245 IF T$="Y" AND A=1 THEN LPRIN
T "*****"; B:
": LPRINT : LPRINT
247 IF T$="Y" THEN PRINT TAB 12
;M$(A): GO TO 264
252 PRINT TAB 6;M$(A);TAB 18;B
264 DIM C$(74): LET J=6: LET K=
2: LET C$=C$(TO 2+D-2)+Z$
270 FOR Z=1 TO C+D-1: PRINT AT
J,K;C$(2+Z-1 TO 2+Z): LET K=K+4
280 IF (Z/7=INT (Z/7)) THEN LET
J=J+2: LET K=2
290 NEXT Z
295 IF T$="Y" THEN COPY : NEXT
X
296 IF T$="M" THEN COPY
299 INPUT "ANOTHER YEAR OR MONTH
(Y/N): "; Y$: IF Y$<>"N" THEN R
UN
300 DATA "JANUARY","FEBRUARY","
MARCH","APRIL","MAY","JUNE","JUL
Y","AUGUST","SEPTEMBER","OCTOBER
","NOVEMBER","DECEMBER"
310 STOP
1000 CLS
1010 PRINT "To print the followi
ng press:"
1015 PRINT : PRINT
1040 PRINT "L--- To Lprint"
1045 PRINT "C--- THIS CALENDAR
IS FOR: "
1050 PRINT "M--- MONTH of BIRT
H"
1060 PRINT "Y--- YEAR of BIRTH
"
1070 PRINT "N--- If you don't wa
nt to Lprint"
1120 IF INKEY$="M" THEN GO TO 40
00
1130 IF INKEY$="Y" THEN GO TO 50
00
1140 IF INKEY$="T" THEN GO TO 60
00
1150 IF INKEY$="N" THEN RETURN
1157 IF INKEY$="C" THEN GO TO 85
00
1160 GO TO 1100
4000 LPRINT : LPRINT " M
ONTH of BIRTH": LPRINT : GO TO 1
100
5000 LPRINT : LPRINT " Y
EAR of BIRTH": LPRINT : GO TO 11
00
6000 CLS : PRINT : PRINT : PRINT
"Do you want the Lprint CENTERE
D?"
6010 IF INKEY$="Y" THEN GO TO 61
00
6020 IF INKEY$="N" THEN GO TO 63
00
6030 GO TO 6010
6100 PRINT : PRINT "Enter up to
32 characters."
6110 INPUT Z$: IF LEN Z$>32 THEN
GO TO 6110
6150 LET L=(32-LEN Z$)/2
6160 LPRINT TAB INT L;Z$
6165 LPRINT " "
6170 GO TO 1000
6300 PRINT : PRINT "Enter up to
32 characters."
6310 INPUT Z$: IF LEN Z$>32 THEN
GO TO 6310
6350 LPRINT Z$
6355 LPRINT " "
6360 GO TO 1000
8500 LPRINT : LPRINT " THIS
CALENDAR IS FOR: "
8510 LPRINT : GO TO 1000

```

Tape Backup

Here is a program from Larry Kenny of Larken Electronics to backup any 2068 program. The program requires two tape recorders, one to play the tape, and one to record the program. The program can be located anywhere in free memory. Follow the instructions as given in the program. Once the code is set, it can be **SAVED** and **LOAD**ed separatly and called by **RAND USR x**, where x is the starting point of the code. Here is the machine code listing:

```
0010  ORG 60000
0020  ENT
0030  start IN A, 254
0040      RRA
0050      RRA
0060      RRA
0070      JR NC,exit
0080      BIT 3,A
0090      JR Z,zero
0100      OR 4
0110  zero OUT 254,A
0120      JR start
0130  exit  EI
0140  RET
```

1 REM Tape To Tape backup
program using 2 tape recorders

by LARRY KENNY

```
10  CLEAR 60000
20  FOR a=60000 TO 60019
25  READ x: POKE a,x
30  NEXT a: CLS
40  PRINT " This Program is fo
r making tape to tape copies
using the 2068 as a signal rec
onditioner": PRINT
50  PRINT " Using 2 tape recor
der's, play the original tape i
nto the input of the 2068(lea
r) and record your backup t
ape from the output of the 20
68(mic). Adjust the play vol
ume so the border doesnt flick
to much on the silent periods o
f the tape."
60  PRINT: PRINT " Rewind both
tape recorders and start them b
oth at the same time",," 10:10:10
10:10:10
70  RANDOMIZE USR 60000
100 DATA 243,219,254,31,31,31,4
8,10,203,95,40,2,245,4,211,254,2
4,239,251,201
```

=== HELP ===

DOES ANYONE HAVE A COPY OF
-SKIN DIVER-? Mine wont load
ANY LONGER AND I WOULD
APPECEATE IT IF I COULD MAKE A
COPY FROM SOMEONE.....ROD

dB

BY RICH TENNANT



BY OLEG D. JEFIMENKO

Have you ever tried to copy drawings from the monitor screen with your 2040 printer? If you have, you know that the printer does not reproduce them correctly: circles become ellipses, squares become elongated and distorted, angles between slanted lines become enlarged or reduced. The reason for these changes is that 2040 printer uses a pixel grid with rectangular rather than with square cells (the original Sinclair printer used a pixel grid with square cells).

A simple adjustment of your PLOT or DRAW statements will produce geometrically correct prints of all curves, shapes, and patterns. All that you need to do is to divide the variable part of the x coordinates in the PLOT or DRAW statements by the "aspect ratio," $A=0.82$, or to multiply the variable part of the y coordinates by the same ratio. The effect of such an adjustment can be demonstrated with the following examples.

Program 1 (TS 1000 or 1500) draws a diagonal square on the monitor screen. When the square is printed by using the COPY command, the printer changes it into a "diamond," or rhombus (Fig. 1).

Program 2 draws the same square but incorporates the aspect-ratio correction. The print is now a true square, although somewhat distorted because of the low resolution of the computer (Fig. 2). Incidentally, the expressions placed in parentheses in lines 20-50 of Programs 1 and 2 are the variable parts of the x and y coordinates. The constant parts are the coordinates of the center of the square, $x=31$ and $y=21$. As mentioned above, only the variable parts need to be adjusted in order to produce correct prints.

Program 3 (TS 1000 or 1500) draws a circle on the monitor screen. When copied by the printer, the circle becomes an ellipse (Fig. 3).

Program 4 draws the same circle corrected for aspect ratio. The print is now a true circle (Fig. 4).

Program 5 (TS 2068) draws a slanted equilateral triangle on the monitor screen by using a DRAW statement (the same triangle can be drawn by using a PLOT statement, but DRAW is much faster). The printed copy of the triangle is badly distorted (Fig. 5).

Program 6 draws the same triangle corrected for aspect ratio. Now the triangle is equilateral, as it should be (Fig. 6).

Program 7 (TS 2068) draws a circle by using a CIRCLE statement. When copied, the circle becomes an ellipse (Fig. 7).

Program 8 draws the same circle by using a PLOT statement with aspect-ratio correction (there is no way to use the aspect-ratio correction with CIRCLE statements). The printed copy is a perfect circle (Fig. 8).

Naturally, you cannot use the same PLOT or DRAW statements to create a correct drawing both on the monitor screen and on the printout; one or the other will always be distorted.

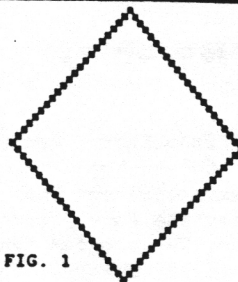


FIG. 1

```
10 FOR X=0 TO 21
20 PLOT 31+X,21-(21-X)
30 PLOT 31+(21-X),21+X
40 PLOT 31-X,21+(21-X)
50 PLOT 31-(21-X),21-X
60 NEXT X
```

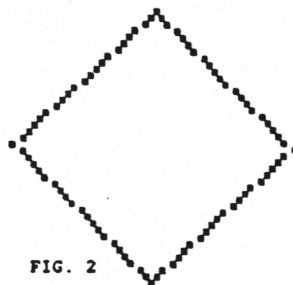


FIG. 2

```
10 FOR X=0 TO 21
20 PLOT 31+X/.82,21-(21-X)
30 PLOT 31+(21-X)/.82,21+X
40 PLOT 31-X/.82,21+(21-X)
50 PLOT 31-(21-X)/.82,21-X
60 NEXT X
```

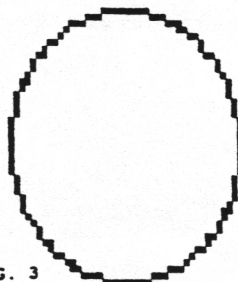


FIG. 3

```
10 FOR T=0 TO 2*PI STEP 1/21
20 PLOT 31+21*COS T,21+21*SIN T
30 NEXT T
```

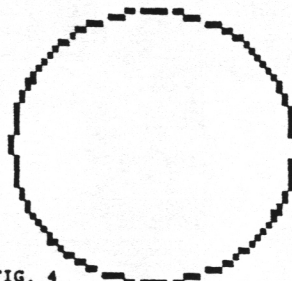


FIG. 4

```
10 FOR T=0 TO 2*PI STEP 1/21
20 PLOT 31+21*COS T/.82,21+21*
SIN T
30 NEXT T
```

What happens if you incorporate the aspect-ratio correction into the y coordinates rather than into the x coordinates? Remove the division by 0.82 in the above programs and multiply the variable parts of the y coordinates by 0.82 instead. The printed copies will be correct again, although smaller than before. For this reason it is usually safer to incorporate the aspect-ratio correction into the y coordinates: since the drawings become smaller, there is no danger of running out of screen when the correction is made.

As the final demonstration of the aspect-ratio correction, examine Figs. 9 and 10. They show the two ornamental designs created by Ted Knysssek (RAMTOP, December 1985, p. 3) corrected for aspect ratio. The original shapes were elliptical; the corrected ones are circular. The correction was made by using $x/0.82$ instead of x in the DRAW statements of the original programs.

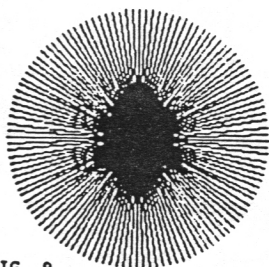


FIG. 9

```
5 FOR A=0 TO 360 STEP 3
10 LET X=80*SIN (A*PI/180)
20 LET Y=80*COS (A*PI/180)
25 PLOT 120,87: DRAW X/.82,Y
30 NEXT A
```

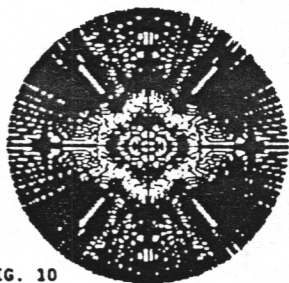


FIG. 10

```
10 OVER 1
20 LET LI=400
30 LET A=0: LET ANG=2*PI/LI
40 FOR I=1 TO LI
50 LET X=85*CO3 A
60 LET Y=85*SIN A
70 PLOT 120,80
80 DRAW X/.82,Y
90 LET A=ANG
100 NEXT I
110 OVER 0
```

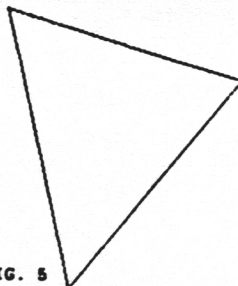


FIG. 5

```
10 PLOT 40,174
20 DRAW 174*SIN (PI/12),-174
30 DRAW 174-174*SIN (PI/12),17
4-174*SIN (PI/12)
40 DRAW -174,174*SIN (PI/12)
```

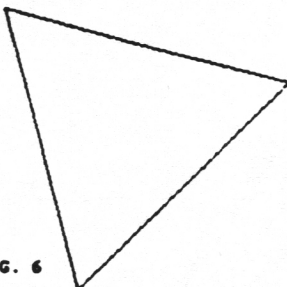


FIG. 6

```
10 PLOT 40,174
20 DRAW 174*SIN (PI/12)/.82,-1
74
30 DRAW (174-174*SIN (PI/12))/
.82,174-174*SIN (PI/12)
40 DRAW -174/.82,174*SIN (PI/1
2)
```

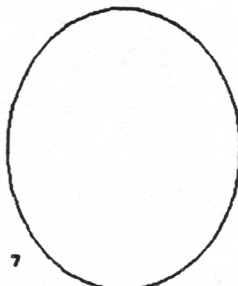


FIG. 7

```
10 CIRCLE 120,87,87
```

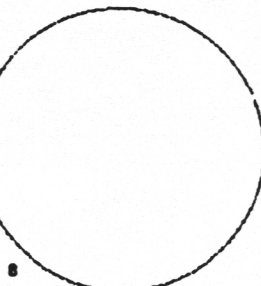


FIG. 8

```
10 FOR T=0 TO 2*PI STEP 1/87
20 PLOT 120+87*CO3 T/.82,87+87
85IN T
30 NEXT T
```

EDITOR'S NOTE: For full-size printers, I find that an aspect ratio of .91 (rather than .82) works very well.

EDITOR'S NOTE:



VSUG

THE VANCOUVER SINCLAIR USERS GROUP HAS BEEN IN EXISTENCE SINCE 1982. WE ARE A SUPPORT GROUP FOR THE OWNERS AND USERS OF THE: MICROACE, ZX80, ZX81, T/S1000, T/S1500, SPECTRUM, SPECTRUM +, T/S2068, AND QL COMPUTERS.

PRES.--KEN ABRAMSON
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